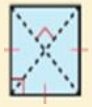
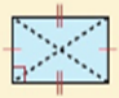
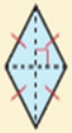
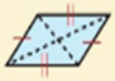
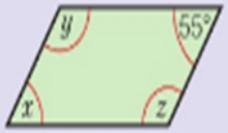
Topic/Skill	Definition/Tips	Example
7.1 Quadrilaterals	Classify quadrilaterals by their geometric properties. Solve problems using side and angle properties of special quadrilaterals.	**Key point** A diagonal is a line that joins two opposite vertices of a shape. When diagonals bisect each other, they cut each other in half. The properties of a shape are facts about its side, angles, diagonals and symmetry. Here are some of the properties of the special quadrilaterals that you should know.

Square 	• All sides are equal in length • Opposite side are parallel • All angles are 90° • Diagonals bisect each other at 90°	**Rectangle** 	• Opposite sides are equal in length • Opposite sides are parallel • All angles are 90° • Diagonals bisect each other
Rhombus 	• All sides are equal in length • Opposite sides are parallel • Opposite angles are equal • Diagonals bisect each other at 90°	**Parallelogram** 	• Opposite sides are equal in length • Opposite sides are parallel • Opposite angles are equal • Diagonals bisect each other
Kite 	• 2 pairs of sides are equal in length • No parallel sides • 1 pair of equal angles • Diagonals bisect each other at 90°	**Trapezium** 	• 1 pair of parallel sides
		Isosceles trapezium 	• 2 sides are equal in length • 1 pair of parallel sides • 2 pairs of equal angles

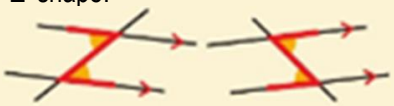
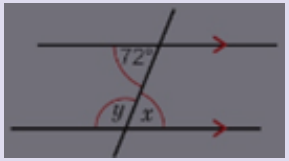
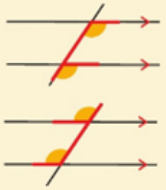
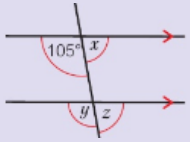
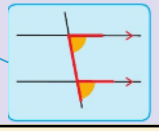
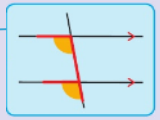
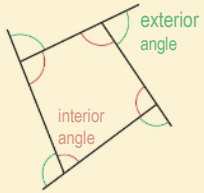
Worked example

In this parallelogram, one of the angles is 55°.
Work out the sizes of the other angles.



X = 55° (opposite angles of a parallelogram are equal)
360 -55 55 = 250° (angles in a quadrilateral add up to 36°0)
250 + 2 = 12°5 (opposite angles of a parallelogram are equal)
Y = 125° and z = 125°

Identify equal angles. Write the reason

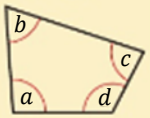
7.2 Alternate angles and proof	Identify alternate angles on a diagram. Understand proofs of angle facts	**Key point** When a line crosses two parallel lines it creates a 'Z' shape. Inside the Z shape are alternate angles. Alternate angles are equal. Alternate angles are on different (alternate) side of the diagonal line  **Worked example** Write the sizes of angles x and y. Give reasons for you answers  X = 72° (alternate angle with 72 °) Y = 180 – 72 = 180° (angles on a straight line add up to 180°) 
7.3 Angles in parallel lines	Identify corresponding angles. Solve problems using properties of angles in parallel and intersecting lines	**Key point** When a line crosses two parallel lines it creates an 'F' shape. There are **corresponding angles** on an F shape. Corresponding angles are equal. Corresponding angles are on the same (corresponding) side of the diagonal line.  **Worked example** Write the sizes of angles x, y and z. Give reasons for you answers  X = 180 – 105 = 75 ° (angles on a straight line add up to 180°) Y = 105° (corresponding angle with 105°) Z = 75° (corresponding angle with x)  
7.4 Exterior and interior angles	Calculate the sum of the interior and exterior angles of a polygon	**Key point** The **interior** and **exterior angles** of a polygon as shown in the diagram.  In an irregular polygon sides are not all equal lengths, and angles are not all equal

Topic/Skill	Definition/Tips	Example
7.4 Exterior and interior angles	Work out the sizes of interior and exterior angles of a polygon	Sum of interior angles: $(n-2) \times 180$, Where n is the number of sides Size of interior angle in regular polygon: $\frac{(n-2) \times 180}{n}$, You can also use the formula; ***180 – size of exterior angle*** Size of exterior angle in a regular polygon: $\frac{360}{n}$, You can also use the formula: ***180 – size of interior angle***
7.5 Solving geometric problems	Solve geometrical problems	1 For each irregular polygon, work out i. the sum of the interior angles ii. the size of the angle marked with a letter a: 52°, 48°, 97°, x b: 105°, y, 80°, 120°, 75° c: 152°, 138°, 43°, 112°, 146°, z a i 360° ii $x = 163°$ b i 540° ii $y = 160°$ c i 720° ii $z = 129°$ 2a For each polygon, work out the size of each exterior angle, and then the sum of exterior angles i, ii, iii, iv 2b **Reasoning** What do you notice about the sum of the exterior angles for each shape? i $a = b = c = d = 90°$, sum = 360° ii $e = 75°, f = 45°, g = 113°, h = 40°, i = 87°$, sum = 360° iii $j = 60°, k = 85°, l = 53°, m = 38°, n = 109°, p = 15°$, sum = 360° iv $q = 100°, r = s = 130°$, sum = 360°

Key point

The angles in a quadrilateral add up to 360°

$a + b + c + d = 360°$



Key point 6

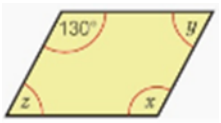
The sum of the exterior angles of a regular polygon is always 360°

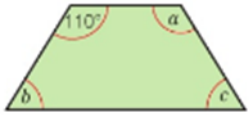
Try these . . .

1. Write which quadrilaterals

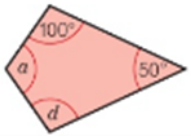
   a have all sides equal
   b have four right angles
   c have two pairs of equal sides
   d have exactly one pair of parallel sides
   e have bisecting diagonals
   f can have four different sized angles

2. In this parallelogram, one of the angles is 130°. Work out the sizes of the other angles



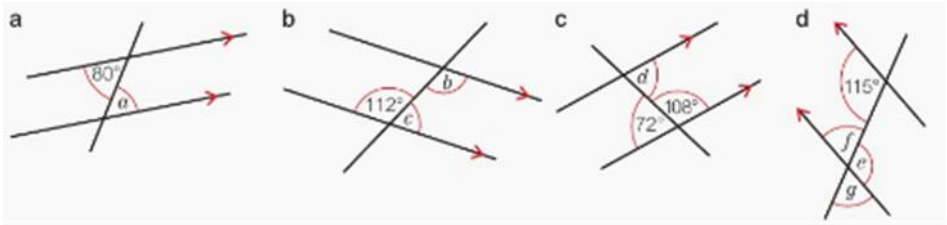


Work out the sizes of the angles marked with letters in this isosceles trapezium



Work out the sizes of the angles marked with letters in the is kite

3. Reasoning: Write the sizes of the angles marked with letters
   Give a reason for each answer



4. Work out the missing exterior angles of these polygons